

CLAIMS

What is claimed is:

1. A thermal transfer interface, comprising:
a thermal spreader forming a plurality of passageways;
5 a spring element coupled with the spreader; and
a plurality of thermally conductive pins for the passageways, each of the pins
having a head and a shaft moving with the spring element, at least part
of the shaft being internal to the passageway and forming a gap with
an internal surface of the passageway, wherein the pin heads
10 collectively and macroscopically conform to an object coupled thereto
to transfer heat from the object to the spreader through the passageway
gap formed between the spreader and each of the plurality of pins.

2. An interface of claim 1, the spring element forming a layer with a
substantially planar face, each of the pin heads protruding from the face in a direction
15 away from the spreader.

3. An interface of claim 1, the spring element forming a layer with a
substantially planar face, each of the pin heads being substantially flush with the face.

4. An interface of claim 1, the spring element forming a layer with a
substantially planar face, each of the pin heads recessed within the spring element.

20 5. An interface of claim 1, each of the pin shafts being substantially
cylindrical, each of the passageways being substantially perpendicular to a planar
surface of the spring element and being substantially cylindrical to accommodate
motion of the shafts therethrough.

25 6. An interface of claim 1, each of the pin shafts being substantially
rectangular, each of the passageways being substantially perpendicular to a planar
surface of the spring element and being substantially rectangular to accommodate
motion of the shafts therethrough.

7. An interface of claim 1, the object comprising one or more semiconductor packages and dies.

8. An interface of claim 1, further comprising a heat sink coupled with the spreader to dissipate heat generated from the object and traveling through the pins and spreader.

9. An interface of claim 1, the spring element comprising a thermally conductive sponge-like material.

10. An interface of claim 1, one or both of the pins and the spreader forming a heat sink.

11. An interface of claim 1, the spring element formed of non-conductive material and forming one or more apertures for thermal energy transfer between the object and the pin heads.

12. An interface of claim 1, the spreader comprising a ventilated metal block.

13. An interface of claim 1, the spring element comprising a plurality of springs disposed with the passageways for biasing the pins outwardly from the spreader towards the object.

14. An interface of claim 1, the spring element comprising a plurality of springs disposed between the pin heads and the spreader for biasing the pins outwardly from the spreader towards the object.

15. An interface of claim 13 or 14, each of the pins forming a shoulder, and further comprising a retaining element for abutting the shoulder in defining a maximal extension of pins.

16. A thermal transfer interface, comprising: a plurality of thermally conductive pins for macroscopically conforming to a surface of an object, each of the pins having a pin head and shaft, the pin heads substantially and macroscopically

conforming with uneven surfaces of an object so as to transfer heat from the object, through the pins to a heat sink.

17. A method for transferring thermal energy from a body to a heat sink, comprising the steps of: biasing a plurality of pins against a surface of the object so
5 that the plurality of pins contact with, and substantially conform to, a macroscopic surface of the object, and communicating thermal energy from the object through the pins to a thermal spreader forming a plurality of air gaps with the plurality of pins.

18. A method of claim 17, the step of biasing comprising biasing the plurality of pins arranged substantially perpendicular to the surface.

- 10 19. A method of claim 17, the step of biasing comprising biasing a plurality of pin heads against the object, the step of biasing further comprising utilizing a thermally conductive sponge material coupled between the spreader and the pin heads.

- 15 20. A method of claim 17, the step of biasing comprising biasing a plurality of pin heads against the object utilizing a plurality of springs.